Author postprint version. Article Accepted for publication in Transportation Research Part F:

Traffic Psychology and Behaviour.

http://www.journals.elsevier.com/transportation-research-part-f-traffic-psychology-and-behaviour/

Please cite as: Beullens, K., & Rhodes, N. (2016). A Longitudinal Study on the Relationship between Adolescents' Medical Drama Viewing and Speeding. *Transportation Research Part F: Traffic Psychology and Behaviour.*

A Longitudinal Study on the Relationship between Adolescents' Medical Drama Viewing and Speeding.

Beullens, K. & Rhodes, N.

Prof. Kathleen Beullens (corresponding author, Kathleen.Beullens@soc.kuleuven.be)
Research Foundation – Flanders (FWO)
Leuven School for Mass Communication Research – KU Leuven
Parkstraat 45 (BOX 3603)
B-3000 Leuven (Belgium)
Tel: +32 16 32.32.19 Fax: +32 16 32.33.12

Prof. Nancy Rhodes (Rhodes.296@osu.edu)
The Ohio State University, School of Communication
154 N. Ovall Mall
3045A Derby Hall
Columbus, Oh 43210 (USA)

A Longitudinal Study on the Relationship between Adolescents' Medical Drama Viewing and Speeding

Abstract

The present study aimed to examine whether watching medical drama had a long-term protective effect on speeding behavior. Specifically, this research examined the extent to which medical drama viewing in adolescence predicts risk perceptions, crash fear, speeding attitudes and self-reported speeding behavior in early adulthood. Using a longitudinal research method, 487 adolescents (M_{age} = 17.7 at baseline) who responded to an earlier survey were re-interviewed five years later. Structural equation modeling indicated that more medical drama viewing at baseline was associated with increased risk perception and higher driving-related fear five years later. The fear of being involved in a traffic crash appeared to be associated with less favorable attitudes toward speeding. Furthermore, in line with the expectations, these speeding attitudes were a significant predictor of self-reported speeding behavior. These results help to provide a better understanding of the relationship between media use and subsequent risk-taking, and have implications for prevention efforts.

Keywords: fear; medical drama; risk perception; risk-taking; speeding; television

A Longitudinal Study on the Relationship between Adolescents' Medical Drama Viewing and Speeding

1. Introduction

The high involvement of young drivers in traffic crashes is well documented in the literature (Elvik, 2010; Niederlaender, 2006; Toroyan & Peden, 2007). The relative injury crash rate for car drivers between 18- and 24-years-old is five to ten times that of drivers in the safest age group (Elvik, 2010). Although there is no question about the greater risk of young drivers relative to older drivers, many questions still remain about the contributors to this phenomenon (Shope, 2006). In this respect, scholars have recently stressed the importance of examining the media as one of the predictors of risky driving behavior (Beullens, Roe, & Van den Bulck, 2011a, 2011b; Fischer, Greitemeyer, Kastenmüller, Vogrincic, & Sauer, 2011). The present study contributed to this line of research by examining the role of exposure to one genre of entertainment media, specifically medical dramas, on the development of risk-averse attitudes, risk perceptions, crash fear and speeding behavior.

Overall, experimental (Fischer et al., 2007, 2008, 2009, 2011) and longitudinal (Beullens et al., 2011a, 2011b) research in this domain has found that exposure to risk-promoting media results in higher accessibility of risk-taking cognitions and affect and in increased risk-taking in a computer simulated driving situation (Fischer et al., 2007, 2008, 2009), and in increased self-reported risky driving (Beullens et al., 2011a, 2011b). However, other work has suggested that the media can have positive influences on consumers. Cultivation theory posits that the media, particularly television, creates in viewers a perception that what they see portrayed in the media reflects reality. Furthermore, viewers watching a lot of television will base their views of reality more strongly on the "reality"

portrayed on television than viewers watching less (Gerbner, Gross, Morgan, & Signorielli, 1986). According to cultivation theory, recurring exposure to the negative consequences of risky driving behavior results in more negative perceptions and attitudes toward risk-taking in traffic, which eventually may result in more cautious driving.

Importantly, there is little longitudinal work examining the role of the media in risky driving behavior. Studying how media exposure as a teenager might affect later risky driving behavior as a young adult is a powerful research methodology that can answer questions about the role of the media in the development of attitudes and beliefs that may contribute to risky or safe driving behavior. More complete knowledge of these factors can help in the development of more effective prevention messages and audience targeting.

One recent study examined whether frequent news viewing as a teenager was associated with later risky driving behavior (Beullens et al., 2011b). The analysis showed that greater exposure to television news among adolescents was associated with lower risk-taking attitudes, intentions and behavior after a two-year interval. This finding is consistent with a cultivation theory explanation because traffic crashes are overrepresented in news media, and reports of traffic crashes often describe negative consequences such as fatalities and injuries (Frost, Frank, & Maibach, 1997). This overrepresentation would cultivate the idea that driving is more risky among those watching television news frequently as opposed to those not watching television news regularly, and was confirmed in the study.

The present study extended this recent line of research on the protective effects of the media on driving behavior in three ways. First, this study examined *medical drama* viewing as a marker of media images showing the negative consequences of driving. To our knowledge, this was the first study to examine this genre in relation to risky driving. Second, this research focused on the long-term relationship between media use and risk-taking by examining the relationship between media use in the teen years and self-reported driving

behavior as a young adult (five years after baseline measurement). Third, this research examined the associations between medical drama viewing, risk perception, crash fear and attitudes, given that past research usually only included one of these constructs (e.g., Beullens et al., 2008, 2011a, 2011b) .

1.1 Medical Drama

There are several reasons why medical drama viewing might be associated with risk-taking cognitions, attitudes and self-reported behavior. Medical dramas such as *ER* and *Grey's Anatomy* feature doctors' efforts to cure illness and prevent death as a major plot line of each episode (Harris & Willoughby, 2009; Moeller, Moeller, Rahey, & Sadler, 2011). Illness and death are prominently featured with patients and dead persons being shown in 35% of the broadcasting time of medical dramas (Van Mierlo, 2007). Death tends to be exaggerated in such programs. The chances of dying from a car crash are almost three times higher on television than in real life (Van Mierlo, 2007). Thus, from the viewpoint of cultivation theory, heavy viewers (those who view more than average) of medical drama should develop a belief that car crashes are both more common, and more deadly, than they are in real life.

Medical drama is often fast-paced and visually exciting, and its popularity has increased over the past decade in Europe as well as in the United States (Baer, 1996; Strauman & Goodier, 2008). Prior research has shown that exposure to medical drama affects the lay public's perceptions of several health topics frequently depicted in medical drama's story lines such as cardiopulmonary resuscitation, seizures, and the like (Diem, Lantos, & Tulsky, 1996; Harris & Willoughby, 2009; Moeller et al., 2011). Furthermore, research within the domain of entertainment-education has indicated that even limited airtime of health topics may have a (modest) impact on viewers' knowledge of health issues, their attitudes, and even behavior (Brodie, Foehr, Rideout, Baer, Flournoy, & Altman, 2001;Valente, Murphy, Huang,

Gusek, Greene, & Beck, 2007). Thus, it was expected that medical drama viewing would affect young drivers' perceptions of the risks of driving.

1.2. Risk Perception, Crash Fear, and Attitudes

Much of the research on the effects of the media on risk-taking behavior has used a theoretical framework based on cultivation theory and this research has regarded television viewing as a direct predictor of risky driving attitudes (see Beullens et al., 2011b). Yet, cultivation theory posits an important distinction between first and second order cultivation effects. First order effects relate to estimations of the prevalence of certain occurrences or facts, whereas second order effects concern attitudes toward specific behaviors. Gerbner et al. (1986) have argued that these first order beliefs are a significant source for the second order broader attitudes. Thus, following cultivation theory, the typical effect of media on behavior is not directly due to the viewing, but rather is through intervening variables such as fear and risk perception. Therefore, extending past research (e.g., Beullens et al., 2011a, 2011b), the present study examined the relationship between medical drama viewing and attitudes, and also included the potential direct and indirect associations between medical drama viewing, crash fear and risk perception. As has recently been emphasized by several authors, there is a lack of knowledge on the pathways through which media use is associated with behavioral changes (Lang & Ewoldsen, 2010; Valkenburg & Peter, 2013). Thus, one of the aims of the present study was to examine two of the potential pathways through which medical drama viewing and speeding attitudes might be related and to examine both direct and indirect relationships.

With regard to fear effects, a considerable amount of research has looked at the relationship between media use and fear (see Cantor, 2011, for an overview). Bartlett and Gentile (2011) have referred to a fear response as one of the major effects of television viewing. Their study indicated that exposure to mass media may elicit global affect, and

specific affective and emotional states. The majority of the research on the association between media and fear has focused on fright reactions as a result of exposure to scary media (horror movies, thrillers etc.; Cantor, 2011). Furthermore, research on the relationship between television viewing (including television fiction), perceived vulnerability and fear of crime has consistently shown that media use predicts estimates of the likelihood of becoming a victim, which in turn predicts fear (Custers & Van den Bulck, 2011; Weitzer & Kubrin, 2004). However, the research on the relationship between exposure to health messages and personal fear reactions proposes a different pathway. Dunlop, Wakefield and Kashima (2007) and Lemal (2010) have argued that health messages may evoke thoughts about one's life, which in turn affect risk perceptions. Thus, following the literature, several pathways are plausible. On the one hand, a consistent body of research in the domain of "fear of crime" has regarded media use as a direct determinant of risk perception, which in turn affects fear of crime. On the other hand, the research in the domain of health communication has advocated that health messages have an impact on personal fear, which in turn predicts risk perceptions. Furthermore, evidence has accumulated which suggests that cognitions such as attitudes can be predicted by affective states such as fear (Forgas, 2001; Frijda, Manstead, & Bem, 2000).

With regard to the relationship between driving behavior and risk perception, it has been shown that underestimating one's crash risk (often accompanied by overestimating driving skill) predicts crash involvement (Ivers, Senserrick, Boufous, Stevenson, Chen, Woodward, et al., 2009; Taylor, Deane, & Podd, 2007). Rhodes and Pivik (2011) reported that affect and risk perception were independent predictors of risky driving behavior, and both constructs mediated the relationship of age and gender with risky driving behavior.

1.3. Hypothetical Model

Based on these findings, a hypothetical model (Figure 1) was constructed which examined the long-term associations between medical drama viewing, the fear of being

involved in a traffic crash, crash risk perception and attitudes toward speeding. The main aim of the study was to determine whether medical drama viewing in adolescence is a marker for risk perceptions, crash fear, attitudes and self-reported speeding behavior in later adulthood.

The study focused on one particular form of risky driving behavior because research has indicated that different forms of risky driving behavior are predicted by different variables (Fernandes, Job, & Hatfield, 2007). Within the variety of risky driving behaviors, the present research focused on speeding because speeding remains the most frequent traffic offense (De Pelsmacker & Janssens, 2007). It increases stopping distance, gives the driver less time to react in a dangerous situation (Williams, Kyrychenko, & Retting, 2006), and is an important cause of traffic crashes (European Transport Safety Council, 1995). Furthermore, speeding seems to be more prevalent among younger drivers compared to older drivers, and declines with age (Royal, 2003). Therefore, it is an important risk behavior to examine among young drivers.

We propose the following hypotheses:

H1. Medical drama viewing at baseline measurement is a direct positive predictor of crash risk perceptions and of the fear of being involved in a traffic crash.

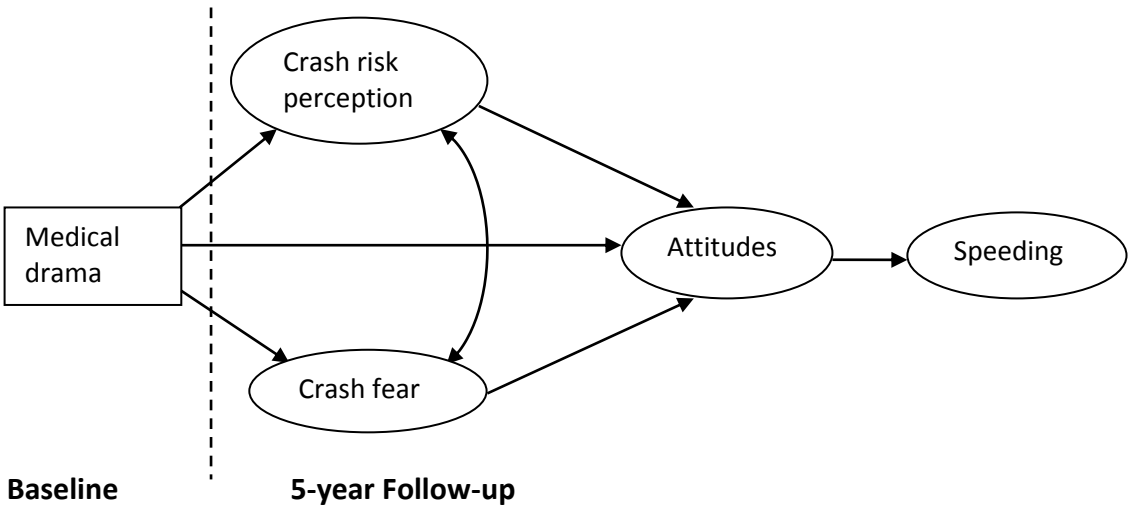
H2. Crash fear and crash risk perception are negatively associated with speeding attitudes.

H3. Medical drama viewing at baseline is an indirect negative predictor of the attitudes toward speeding and self-reported speeding behavior. This relationship is mediated through crash risk perception and the fear of being involved in a traffic crash.

H4. Speeding attitudes significantly predict self-reported speeding behavior.

Figure 1

Hypothetical model of the relationship between medical drama viewing and speeding.



Note. *Gender, total number of hours of TV viewing and intensity seeking are controlled for in this model, but were omitted for graphic representation.*

2. Method

2.1 Sample

This research used a longitudinal research design (two waves, five year interval) in order to examine whether one type of media use, namely medical drama viewing, in adolescence would contribute to attitudes, perceptions and behaviors that put young drivers at risk of crashing. This design permits the investigation of the risk factors that contribute to negative outcomes later.

For the baseline measurement, administrators of a stratified random sample of 20 secondary schools in Flanders (Belgium) were contacted and asked to cooperate in a large-scale study on the leisure activities of youth and traffic safety. All students from the fifth and sixth year (i.e., the last two years of secondary education) of schools willing to participate were included in the sample. All ethical guidelines applicable in the country where the study

was conducted (Belgium) were followed. Before completing the survey, participants were informed about the study purposes and procedures. They were asked to participate in a study on young individuals' leisure activities (part 1) and opinions on traffic safety (part 2). A research assistant was present during data collection to answer any questions respondents might have had, to ensure confidentiality and that adolescents could respond to the questions without interference from fellow students or teachers. Adolescents were clearly informed that participation was purely voluntary and that they had the option to withdraw from the study at any time without any consequences. However, all adolescents in the selected schools present at the day of data collection completed the questionnaire.

In total, 2193 students filled out a standardized, self-administered questionnaire which included measures of television viewing, demographics and personality characteristics. In the baseline sample, 65.2% of the students were boys, 34.8% were girls. The vast majority of our respondents were 17 (36.5%) or 18 (41.7%) years old at baseline. Because a standard driver's license cannot be obtained before the age of 18 in Belgium, 91.3% of the respondents in the first wave did not yet have their driver's license during data collection. The strict confidentiality of the respondents' answers was assured before as well as after the completion of the questionnaire. Next, students were asked to provide their contact information. In total, 89.5% agreed to do so and provided their home address, and 71.3% provided their e-mail address.

In 2011, five years after this baseline measurement, respondents were contacted again with a request to take part in the follow-up study. In total, three reminder emails were sent to all participants who had not yet completed the online survey. For those who did not respond to these emails and to those who had not provided their email address, a letter was sent to their home address. This letter included a link to the online survey. Again, three reminders were sent resulting in a total response of 652 completed questionnaires. In sum, 30% of the

respondents who completed the first wave took part in the follow-up study. The analyses of the non-responders indicated that females were more likely to have completed both measurements.

As the present study included self-reported speeding behavior as a dependent variable, only respondents with a driver's license (n=487) were included here (i.e., 74.7% of the respondents who completed both waves). Thus, only those respondents who completed both waves and had a definitive driver's license (i.e., full driving privileges) at follow-up were included in the analyses for this study. The respondents included in the current study differed significantly from those who completed only the first wave of data collection in terms of gender (more females in the follow-up group), age ($M_{\text{follow-up=}}$ 17.74 vs $M_{\text{one wave =}}$ 17.98, $t(2019)=5.22$, $p<.001$) and intensity seeking ($M_{\text{follow-up=}}$ 2.18 vs $M_{\text{one wave =}}$ 2.39, $t(1970)= 6.60$, $p<.001$) but not in their amount of medical drama viewing ($p>.05$). Of the respondents, 43.4% were 22 years old, 41.9% were 23 years old, 14.5% were 24 or older, and one respondent was 21 years old at the time they completed the Wave 2 survey. Boys (53.8%) were slightly overrepresented. More than half pursued higher education (53.6%), one respondent was still in high school, 40.6% were employed and 3.5% were in search of employment.

2.2. Measures

2.2.1. Baseline measures

Media exposure. To measure exposure to medical dramas, respondents were asked: "how often do you watch medical drama such as … (list of medical drama series aired at the time)." Response categories were (0) never, (1) a few times a year, (2) about once a month, (3) a few times a month, (4) about once a week, (5) a few times a week, (6) (almost) every day.

To assess overall television exposure, the total number of hours of television viewing per week was measured with a timeline for each day of the week. The timelines began at 7

a.m. and ended at 4 a.m. Each line consisted of 42 checkboxes, each representing a half hour of possible television viewing time. Respondents were asked to mark the period(s) of time at which they normally watch television on that particular day (Eggermont, 2006). The total number of hours of television viewing per week was computed by counting the marked checkboxes for each respondent and dividing the result by two.

Intensity seeking: In line with previous research, four items of the intensity factor of Arnett's Inventory of Sensation Seeking (AISS) were used (Arnett, 1994; Beullens et al., 2011a, 2011b; Haynes, Miles, & Clements, 2000). The AISS consists of two factors: intensity seeking and novelty seeking. The intensity factor consists of items such as "I like the feeling of standing next to the edge of a high place and looking down" or "I can see how it must be exciting to be in a battle during a war". The novelty factor consists of items such as "I think it's fun and exciting to perform or speak before a group" or "I don't like spicy food". Research has indicated that intensity seeking is related to media use and risky driving, while novelty seeking is not (Beullens et al., 2013). Therefore, we opted to include only the intensity factor. Principal components factor analyses indicated that six items of the original scale loaded onto the intensity factor. Two items were removed from this factor since they referred to television content (e.g., 'I like a movie where there are a lot of explosions and car chases'). The remaining four items loaded onto the intensity factor and were kept in the analyses. Responses ranged from (1) do not agree at all, (2) do not agree, (3) agree, to (4) totally agree. Although Cronbach's alpha for these items was low (Cronbach's alpha =.52) (which might in part be explained by the low number of items), this scale was included in the model since it was felt that this construct was an important control variable.

Gender. Respondents indicated whether they were a boy (0) or girl (1).

2.2.2. Measures at 5-year follow-up

Crash risk perception. Consistent with suggestions in the research literature (see above, Lemal, 2010, Snyder & Rouse, 1995; Tyler & Cook, 1984), both personal and general crash risk perception were assessed in the questionnaire. The following items were used: (a) "How likely do you think it is that the average Flemish person will be involved in a car crash?", (b) "How likely do you think it is that someone of your age will be involved in a car crash?", (c) "How likely do you think it is that you will be involved in a car crash?". Answer categories ranged from -5 (very unlikely) to +5 (very likely) (11 categories). These items are similar to what has been used in previous research (see Helweg-Larsen & Shepperd, 2001; Lemal & Van den Bulck, 2011). Principal components analyses showed that these items composed one factor with good internal reliability (Cronbach's alpha=.82).

Fear of crash. Next, a measure of the fear of being involved in a traffic crash was included in the questionnaire. Three items were used to assess this construct: (a) "How afraid are you of being involved in a car crash?", (b) "How afraid are you of getting injured in a car crash?", (c) "How afraid are you of getting killed in a car crash?" Answer categories ranged from -5 (not afraid at all) to +5 (very afraid) (11 categories). Again, principal components analysis yielded one factor with good internal reliability (Cronbach's alpha=.96).

Attitude toward speeding. Similar to previous research on the relationship between media use and risky driving (Beullens et al., 2011b), Ulleberg and Rundmo's (2002) driving attitudes scale was used to measure respondents' attitudes toward speeding. Response categories ranged from 1 (totally disagree) to 4 (totally agree). The items are presented in Table 1. A principal components analysis with oblique rotation resulted in one factor which showed good internal reliability (Cronbach's alpha=.88, 5 items).

Speeding behavior. Self-reported speeding behavior was assessed using two items of Begg and Langley's (2004) risky driving scale: (a) "How often do you drive fast for the thrill

of it?"; (b) "How often do you drive faster than allowed on the open road?". Response categories were (0) never, (1) seldom, (2) sometimes, (3) often, (4) very often, and (5) always.

2.3. Strategy for Analyses

First, descriptive analyses were conducted with SPSS™22.0. Second, structural equation modeling (maximum likelihood method) was used to determine the associations between medical drama viewing, fear, risk perception, attitudes and speeding. The analyses were conducted with AMOS™20.0. Due to the inconclusiveness in the literature with regard to the relationship between risk perception and fear (see above), and following the advice of Preacher and Hayes (2008) on multiple mediator models, a hypothetical model was constructed in which risk perception and fear of a traffic crash were both expected to be predicted by media use and were expected to covary (see Figure 1).

Although the skewness and kurtosis level of the constructs in the model were within the acceptable thresholds (absolute value below .5 for intensity seeking, risk perception, fear, speeding attitudes and speeding behavior; and between 1 and 2 for medical drama viewing and total television viewing), bootstrapping (95% bias-corrected bootstrapped confidence intervals, 1000 samples) was used to validate the significance tests of the reported analyses (normal theory method) (Kline, 2010). These 95% bias-corrected bootstrapped confidence intervals confirmed all significant results and are reported in the analysis section. In addition, Sobel tests were used to confirm the mediation effects in the model.

Given that research has shown that gender and intensity-seeking are associated with both media use and risk-taking, these constructs were included as control variables in the model (Hall, 2005; Rhodes & Pivik, 2011; Ulleberg & Rundmo, 2003). Finally, respondents' total number of hours of television viewing a week was added as a control variable. The inclusion of this variable allowed a check on whether medical drama viewing specifically was

related to risk-taking, or whether medical drama viewers were in fact just watching a lot of television in general and a similar relationship was found with overall television viewing.

3. Results

3.1. Descriptive Statistics

Table 1 gives an overview of the descriptive values of the measures used in this study. Of the respondents, 61.9% reported they watch medical drama. A total of 15.2% watched a few times a year, 7.9% about once a month, 11.7% a few times a month, 15.6% once a week, and 11.5% a few times a week or almost every day.

Table 1

Mean (M), standard deviation (SD) and range of the main constructs

Items	***M***	***SD***	**Range**
Risk perception (sum items divided by number of items)	1.06	1.58	9
How likely do you think it is that…			
1. the average Flemish person will be involved in a car crash?	1.05	1.70	9
2. someone of your age will be involved in a car crash?	1.98	1.66	9
3. you will be involved in a traffic crash?	0.16	2.12	10
Fear (sum items divided by number of items)	1.09	3.02	10
How afraid are you of…			
1. being involved in a car crash?	0.99	2.98	10
2. getting injured in a car crash?	1.22	3.07	10
3. getting killed in a car crash?	0.96	3.34	10
Attitudes speeding (Ulleberg & Rundmo, 2002) (sum items divided by number of items)	2.46	.74	3
1. If you have good skills speeding is OK	1.92	0.87	3
2. It is acceptable to drive 100 km/h on a straight road if there are no other vehicles around[1]	2.29	0.96	3
3. I think it is Ok to speed if the traffic conditions allow you to do so	2.52	0.95	3
4. Driving 5 or 10 km/h above the speed limit is OK because everyone does it	2.94	0.78	3
5. If you are a safe driver, it is acceptable to exceed the speed limit by 10 km/h in areas permitted to drive 80 or 90 km/h	2.61	0.92	3
Speeding behavior (Begg & Langley, 2004) (sum items divided by number of items)	1.47	.94	4.5

1. How often do you drive fast just for the thrill of it	0.60	0.88	4
2. How often do you drive faster than 120kph on the open road?	2.34	1.37	5
Total number of hours of television viewing per week	18.43	9.73	65
Watching medical drama	1.88	1.89	6
Intensity seeking (sum items divided by number of items)	2.18	.57	3
1. If I were to go to an amusement park, I would prefer to ride the rollercoaster or other fast rides	3.09	.87	3
3. It would be interesting to see a car accident happen	1.72	.81	3
2. I like the feeling of standing next to the edge on a high place and looking down	2.12	.93	3
4. I can see how it must be exciting to be in a battle during a war	1.81	.94	3

[1]*Note: On most Belgian normal roads (not highways), the speed limit is 30kph, 50kph, 70kph or 90kph. The maximal speed on Belgian highways is 120kph.*

Driving faster than 120kph on the open road was reported by 90.6% of the respondents. Nineteen point seven percent seldom engaged in this behavior, 26.2% sometimes, 22.3% often, 16.8% very often, and 5.7% always. Driving fast for the thrill of it was less frequently reported. Of the respondents, 61% never exhibited this behavior, 23.1% seldom, 12.0% sometimes and 4.0% often or very often.

Table 2

Pearson correlations between the main constructs

	1.	2.	3.	4.	5.	6.
1. Risk Perception	1					
2. Fear	.30**	1				
3. Attitudes speeding	-.07	-.30**	1			
4. Speeding behavior	-.00	-.24**	.60**	1		
5. Hours TV/week	-.02	.06	.12*	.16**	1	
6. Medical drama	.15**	.21**	-.11*	-.07	.22**	1
7. Intensity seeking	-.15**	-.25**	.24**	.26**	.00	-.13**

** p<0.05, **p<0.01*

The zero-order correlations between the main constructs in the model are displayed in Table 2. These results indicated a significant association between medical drama viewing on the one hand and risk perception, fear and respondents' speeding attitudes on the other hand.

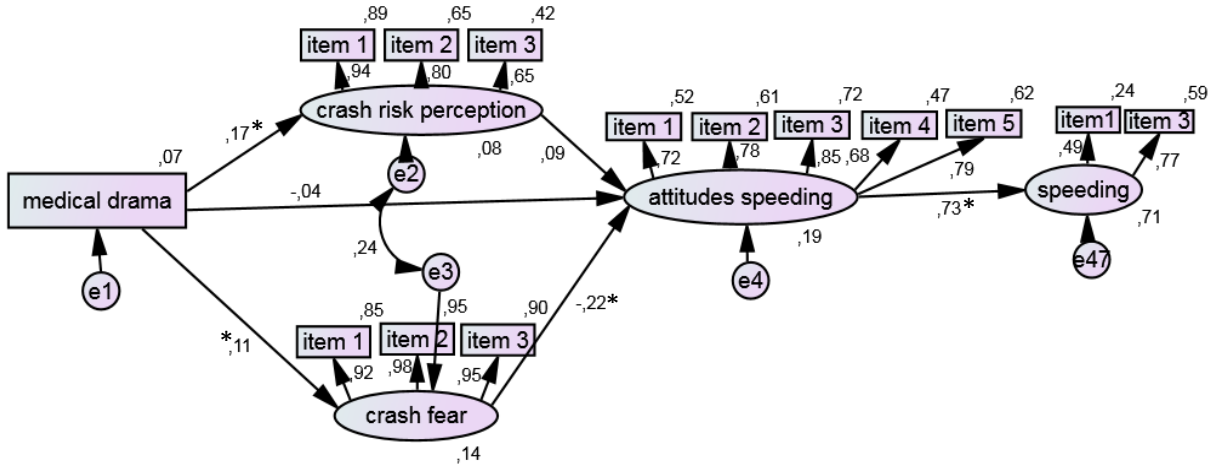
Partial correlations indicated that the direct association between medical drama viewing and speeding attitudes disappeared when controlling for respondents' crash fear ($p>.05$), but not when respondents' risk perception was added as a control variable ($r=-.13$, $p<.01$).

3.2. Testing the Hypothetical Model

Structural equation modeling was used to test the hypothetical model. The results of these analyses are displayed in Figure 2. The chi-squared-to-degrees-of-freedom ratio *(χ^2/df)*, the Comparative Fit Index (*CFI*) and the Root Mean Square Error of Approximation (*RSMEA*) were used to determine the model fit (Arbuckle, 2007). *RMSEA* values lower than 0.05 and *CFI* values over .90 are indicative of a close fitting model. A relative chi-square measure within the range of 2 to 1 or 3 to 1 provides an indication for an acceptable fit between the model and the sample data (Arbuckle, 2007). The fit indices indicated a good fit for the model (*RMSEA*=.049, *CFI*=.962, $p=.000$, $X^2=319.942$, $\chi^2/df=2.162$) (Arbuckle, 2007). Overall, the constructs in the model explained 20% of the variance in the attitudes toward speeding, and 71% of the variance in self-reported speeding.

Figure 2

Structural equation model for the relationship between medical drama viewing and self-reported speeding behavior (RMSEA=.05, CFI=.96, p=.00, X^2=319.94, X^2/df=2.16)



Note. **Standardized regression coefficient significant at p<.05. Control variables (intensity seeking, total number of hours of television viewing per week, and gender) were omitted for graphic representation, but the shown coefficients are those of the completed model including control variables.*

As shown in Table 3, the model's results indicated that women (compared to men) had more negative attitudes toward speeding (standardized regression coefficient γ=-0.16), more fear of being involved in a traffic crash (γ=0.16), reported speeding behavior less frequently (γ=-0.15), watched more medical drama (γ=0.28), but reported a lower number of hours of television viewing per week (γ=-0.15). Respondents scoring high on intensity seeking made lower risk estimations (γ=-0.24) and were less afraid of being involved in a traffic crash (γ= -0.21). The total number of hours of television viewing a week predicted speeding attitudes (γ=0.12), such that more television viewing was associated with more positive attitudes toward speeding. Apart from these constructs, gender, intensity seeking, and total television viewing did not explain a significant portion of the variance of the other constructs in the model.

Table 3

Standardized regression weights, and associated 95% bias-corrected bootstrapped confidence intervals for the significant relationships between the control variables and medical drama viewing, risk perception, fear, attitudes and speeding behavior

		Estimate	*LLCI*	*ULCI*
Medical drama	← Gender	.28	.15	.41
Crash fear	← Gender	.16	.02	.28
Total TV	← Gender	-.15	-.29	-.01
Attitudes speeding	← Gender	-.16	-.32	-.01
Speeding	← Gender	-.15	-.29	-.01
Crash fear	← Intensity seeking	-.21	-.38	-.07
Risk perception	← Intensity seeking	-.24	-.43	-.07
Attitudes speeding	← Total TV	.12	.02	.21

Hypothesis 1 predicted that medical drama viewing in adolescence was a direct positive predictor of crash risk perception and crash fear in emerging adulthood. It was expected that respondents who reported watching more medical drama would also report greater fear of being involved in a traffic crash and would perceive greater risks associated with driving.

The results from the bootstrapped analyses (1000 samples, 95% bias-corrected confidence intervals) confirmed this hypothesis and indicated that medical drama viewing as a teenager was a direct positive predictor of the fear of being involved in a traffic crash (γ= .11, *LLCI/ULCI*: .03/.21) and of crash risk perception (γ=.17, *LLCI/ULCI*: .06/.27) as a young adult. The fear of being involved in a traffic crash appeared to be a direct negative predictor of the attitudes toward speeding (γ=-.22, *LLCI/ULCI*: -.32/-.12), but crash risk perception was

not (γ=.09, *LLCI/ULCI*: -.02/.19). Thus, the second hypothesis was only confirmed for crash fear. Also no direct relationship between medical drama viewing and attitudes was found (γ=-.04, *LLCI/ULCI*: -.14/.06).

In line with our expectations (Hypothesis 4), attitudes were a good predictor of self-reported speeding behavior (γ=.73, *LLCI/ULCI*: .64/.83). Respondents who indicated more positive attitudes toward speeding also reported more speeding behavior.

Finally, the indirect association between medical drama viewing at baseline and speeding attitudes five years later was examined (Hypothesis 3). As indicated above, the zero-order correlations showed an association between medical drama viewing and attitudes (see Table 2), which became non-significant when crash fear was entered as a control. Sobel tests also indicated support for the hypothesis that the relationship between medical drama viewing and attitudes was mediated through crash fear (Sobel test statistic: -2.13, two-tailed significance $p< 0.05$) (Preacher & Hayes, 2008). However, this was not the case for risk perception (Sobel test statistic: 1.51, $p>0.05$). Thus, Hypothesis 3 was partially supported; according to the Sobel test, fear mediated the relationship between medical drama viewing and attitudes, although risk perception did not.

4. Discussion

The present research demonstrated that media exposure to the genre of medical dramas in the teen years was a protective factor for driving risk. Frequent medical drama viewing in the years prior to obtaining a driver's license was associated with an elevated fear of being involved in a car crash five years later, which in turn was a negative predictor of respondents' attitudes toward speeding. In line with previous research, these attitudes were a positive predictor of self-reported speeding behavior (Ajzen & Fishbein, 2005). These results remained significant after controlling for overall television viewing, the intensity factor of sensation seeking, and gender.

The results of the present study provide insight into aspects of the teen media environment that influence later crash risk perception, crash fear, driving attitudes and self-reported driving behavior. The media programming consumed by teens can set the stage for more or less risky behavior and media exposure can influence risky behavior in a variety of ways. Some studies have found that media exposure glorifying reckless behavior can lead to riskier attitudes and behavior (Beullens et al., 2011a; Beullens & Van den Bulck, 2013). In the present investigation, as in others (Beullens et al., 2011b), media depictions of the negative consequences of car crashes were found to lead to increased risk perception and crash fear. Increased fear in turn was associated with risk-averse attitudes and self-reported behavior. These findings further elucidate the factors which are associated with risky driving behavior, and the role media might play in these factors. Furthermore, this research focused on the long-term relationship between media use and self-reported driving behavior through the use of a longitudinal study with a five year interval. Few longitudinal investigations have been conducted in this area, thus this research fills an important vacuum in the literature.

Medical drama viewing in the teen years was also associated with crash risk perception as a young adult. However, contrary to our hypothesis, crash risk perception did not explain a significant amount of the variance in speeding attitudes. These results are highly consistent with those of Yaoshan, Wei, and Yongjuan (2011), who concluded that fear appeals affect drivers' attitudes toward speeding directly, and speeding behavior indirectly, through these attitudes. Furthermore, recent research has found that affectively-based attitudes appear to be a stronger predictor of driving intention than cognitively-based attitudes (Rhodes, in press). These results are also consistent with the findings of Ulleberg and Rundmo (2003), who reported that attitudes appeared to be a predictor of risk behavior while risk perception was not.

This research is very relevant for prevention in that the results showed that media use was associated with self-reported health risk behavior. This knowledge suggests that certain genres of media might be used as a tool for prevention in the context of risky driving behavior. Medical dramas have elements that are appealing to teen television viewers in that they are fast-paced and have intense action (Baer, 1996), and have been found to be popular (Strauman & Goodier, 2008). Medical dramas also appear to have a role in the development of crash fear and crash risk perception. In the present research, increased crash fear was directly associated with safer driving attitudes and less self-reported speeding behavior. Thus, exposure to this type of program might be beneficial. These findings are consistent with those that have found medical dramas to be beneficial in the area of entertainment-education, in which intentional messages about health risk can be effectively presented (Brodie et al., 2001;Valente, et al., 2007). The addition of intentional story lines to focus on the negative consequences of teen risky driving might be a promising direction for future prevention efforts. The results of the present research also underscore the importance of early prevention efforts, even before adolescents have their driver's license. Driving perceptions and attitudes develop at a young age (long before young individuals have obtained their license), and it is important to try to address these with prevention campaigns (Berg, 2006; Whissell & Bigelow, 2003).

Given the long term relationship that was observed in the present study, the theoretical framework that might best explain the results is cultivation theory (Gerbner et al., 1986). In the heuristic processing model of cultivation (Busselle & Shrum, 2003; Shrum, 2004), it is argued that the recurring exposure to certain images on television increases exemplar accessibility, which in turn increases estimates of the prevalence of those images in real life. Thus, frequent exposure to vivid exemplars of the consequences of car crashes in medical drama might increase risk estimates because, according to the availability heuristic, these

exemplars are more accessible in memory and consequently easier to remember (Busselle & Shrum, 2003; Shrum, 2004; Tversky & Kahneman, 1973).

The findings in the present study seem to corroborate more recent genre-specific cultivation research. Among others, Cohen and Weimann (2000) and Bilandzic and Rössler (2004) have asserted that it is meaningful to examine the effects of specific television genres because different genres cultivate different perceptions and attitudes. Research indicated that this is also the case for risky driving behaviors (Manganello & Chauhan, 2011). It has been noted that different television genres portray risky driving and/or its consequences totally differently and that they therefore might have different effects (Beullens et al., 2008, 2011a, 2011b). The present study supported this assumption in that an association between medical drama viewing, crash fear, and risk perception was found but not between overall television viewing, crash fear, and risk perception. Thus, there was something specific about medical drama viewing which could not be explained by total television viewing. Yet, more research is necessary in order to fully understand this relationship. Future research should conduct detailed content analyses on the way car crashes are portrayed in medical drama and in other genres. In addition, experimental research might be used to examine the effects of exposure to these messages.

The present study proposes an interesting addition to the literature by including multiple constructs (risk perception, fear, attitudes and self-reported behavior), by examining multiple pathways, and by looking at reported behavior as the dependent construct. Although cultivation researchers usually presume that long term exposure to a certain television genre affects behavior, this is not explicitly stated in the original cultivation theory. Another strength of the study was the long time period considered. Even though cultivation theory deals with long term effects, most cultivation research is correlational in nature. If longitudinal processes are considered, the time lag is usually short. Yet, especially in the

context of prevention, is it important to note that media use can be an early marker for later behavior.

Overall our study contributes to a better understanding of the relationship between media use and health risk behavior. The relationships between these concepts have not yet been the subject of extensive research, despite the fact that media-effects and social-cognitive theories suggest that such media exposure might affect risk perception and crash fear, which are important predictors of behaviors.

Despite its strengths, the study suffered from some important limitations. First, self-reports were used to assess the constructs in our models. Although it can never be ruled out totally that some form of over- or underestimation has taken place, this methodology is extensively used in traffic psychology and communication research. Moreover, social desirability research has indicated that self-report measures have good validity when the confidentiality of the participants is assured (Campanelli, Dielman, & Shope, 1987; Sullman & Taylor, 2010; White, 1991).

Secondly, despite our efforts to maximize response rates, the attrition rate of the study was quite high. Of the respondents from the first wave of data collection, 30% took part in the second wave. This is in accordance with what has been reported in other online surveys, and is unsurprising given the large time lag between both measurements (Millar & Dillman, 2011; Sax, Gilmartin, & Bryant, 2003). Yet it needs to be recognized that the non-response might have been systematic. The analyses of the non-responders indicated significant differences between the sample used in the current study and the sample which completed only the baseline measurements in terms of age, gender and intensity seeking. Subsequently, the sample under study might differ in many ways from the larger population. Therefore, and in spite of the analyses of the non-responders, attrition may have affected the results. More

research is needed to see whether the relationships found in the present study hold into other samples.

Thirdly, future research should also include additional measures to assess the associations between media use, risky driving behavior and the controls. Some of the measures in the current study (i.e., intensity seeking) showed poor internal consistency, which might result in unreliable findings. Additional research using more reliable measures is necessary to replicate the findings from the present study. This research should also include additional controls (e.g., additional personality characteristics, injunctive and descriptive norms, driving experience) which might affect the reported associations.

Fourthly, all of our respondents had a driver's license at the follow-up measurement, but some might have had driving experience at the baseline measurement. Future research might examine these different groups more closely, to test whether the associations reported in the current study differ depending on driving experience (having obtained a driver's license or not, having a lot of driving experience or not).

In the same vein, another limitation of the current study is that it only included one measurement of medical drama viewing. Most likely, medical drama viewing at baseline is a good predictor of later medical drama viewing, which could be a stronger predictor of risk perceptions and crash fear. In addition, the strength of these relationships might also vary depending on the exact content individuals are exposed to and for how long these individuals watch this television content. Future research could try to answer these questions in order to get a more comprehensive understanding of these relationships.

Last but not least, no causality claims can be made based on the design of this study. It was the aim of the study to examine whether later self-reported speeding behavior may be predicted by medical drama viewing, but this does not mean that medical drama viewing causes safer driving behavior. It is important to underline that the results of the present study

only show an association between watching medical drama at baseline and a decrease in self-reported speeding behavior later in life. The perceived correlation might be explained by a third variable which was not included in the study. Possible confounding variables which may be valuable to include in future research are additional personality characteristics (Ulleberg, 2002). Future work could employ experimental methods to address this causality question. In spite of the fact that no causality claims can be made based on the study design used here, the findings remain interesting from the perspective of prevention as they provide important knowledge for the development of new prevention campaigns, both in terms of message development and target groups to address.

5. Funding

The study was funded by a subsidy from the "Lifeline Project" (grant n° 7.0003.05) of the Research Foundation – Flanders (FWO). The corresponding author is also funded by the Research Foundation – Flanders (FWO). The funding source had no involvement in the design of the study, the data collection, analyses or writing of the manuscript.

6. References

Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracin, B.T. Johnson, & M.P., Zanna (Eds.), *The handbook of attitudes* (pp. 173-221). New Jersey-London: Lawrence Erlbaum Associates.

Arbuckle, J.L. (2007). *Amos 16.0 user's guide*. US: Amos development corporation.

Arnett, J.J. (1994). Sensation seeking: A new conceptualization and a new scale. *Personality and Individual Differences*, *16*, 289-296.

Baer, N.A. (1996). Cardiopulmonary resuscitation on television. *The New England Journal of Medicine*, *334*(24), 1604-1605.

Bartlett, C.P., & Gentile, D.A. (2011). Affective and emotional consequences of the mass media. In K. Döveling, C. von Scheve, & E.A. Konijn (Eds.), *The Routledge*

handbook of emotions and mass media (pp. 60-78). London, New York: Routledge.

Begg, D., & Langley, J. (2004). Identifying predictors of persistent non-alcohol or drug-related risky driving behaviors among a cohort of young adults. *Accident Analysis and Prevention, 36*(6), 1067-1071.

Berg, H.Y. (2006). Reducing crashes and injuries among young drivers: What kind of prevention should we be focusing on? *Injury Prevention, 12*(Suppl 1), i15-i18.

Beullens, K., Roe, K., & Van den Bulck, J. (2011a). Excellent gamer, excellent driver? The impact of adolescents' video game playing on driving behavior: A two-wave panel study. *Accident Analysis and Prevention, 43*, 58-65.

Beullens, K., Roe, K., & Van den Bulck, J. (2011b). The impact of adolescents' news and action movie viewing on risky driving behavior: A longitudinal study. *Human Communication Research, 37*, 488-508.

Beullens, K., Roe, K., & Van den Bulck, J. (2013). Driving game playing as a predictor of adolescents' unlicensed driving in Flanders. *Journal of Children and Media*, 7(3), 307-318.

Beullens, K., & Van den Bulck, J. (2008). News, music videos and action movie exposure and adolescents' intentions to take risks in traffic. *Accident Analysis and Prevention, 40*, 349-356.

Beullens, K., & Van den Bulck, J. (2013). Predicting young drivers' car crashes: The role of music video viewing and the playing of driving games. Results from a prospective cohort study. *Media Psychology, 16*(1), 88-114.

Bilandzic, H., & Rössler, P. (2004). Life according to television. Implications of genre-specific cultivation effects: The gratification/cultivation model. *Communications, 29*, 295-326.

Brodie, M., Foehr, U., Rideout, V., Baer, N., Flournoy, R., & Altman, D. (2001). Communicating health information through the entertainment media. *Health Affairs, 20*(1), 192-199.

Busselle, R.W., & Shrum, L.J. (2003). Media exposure and the accessibility model of social information. *Media Psychology, 5,* 255-282.

Campanelli, P.C., Dielman, T.E., & Shope, J.T. (1987). Validity of adolescents' self reports of alcohol use and misuse using a bogus pipeline procedure. *Adolescence, 22*(85), 7-22.

Cantor, J. (2011). Fear reactions and the mass media. In K. Döveling, C. von Scheve, E.A. Konijn (Eds.). *The Routledge handbook of emotions and mass media* (pp. 148-165). London, New York: Routledge.

Cohen, J., & Weimann, G. (2000). Cultivation revisited: Some genres have some effects on some viewers. *Communication Reports, 13*(2), 99-114.

Custers, K., & Van den Bulck, J. (2011). Mediators of the association between television viewing and fear of crime: Perceived personal risk and perceived ability to cope. *Poetics, 39,* 107-124.

De Pelsmacker, P., & Janssens, W. (2007). The effect of norms, attitudes and habits on speeding behavior: Scale development and model building and estimation. *Accident Analysis and Prevention, 39*(1), 6-15.

Diem, S.J., Lantos, J.D., & Tulsky, J.A. (1996). Cardiopulmonary resuscitation on television: Miracles and misinformation. *The New England Journal of Medicine, 334*(24), 1578-1582.

Dunlop, S., Wakefield, M., & Kashima, Y. (2008). Can you feel it? Negative emotion, risk, and narrative in health communication. *Media Psychology, 11*, 52-75.

Eggermont, S. (2006). Television viewing and adolescents' judgment of sexual request scripts:

A latent growth curve analysis in early and middle adolescence. *Sex Roles, 55* (7-8), 457-468.

Elvik, R. (2010). Why some road safety problems are more difficult to solve than others. *Accident Analysis and Prevention, 42*, 1089-1096.

European Transport Safety Council (ETSC), 1995. *Reducing traffic injuries resulting from excess and inappropriate speed*. Retrieved from http://www.etsc.be, accessed on December 5, 2013.

Fernandes, R., Job, R. F. S., & Hatfield, J. (2007). A challenge to the assumed generalizability of prediction and countermeasure for risky driving: Different factors predict different risky driving behaviors. *Journal of Safety Research, 38*, 59-70.

Fischer, P., Greitemeyer, T., Morton, T., Kastenmüller, A., Postmes, T., Frey, D., et al. (2009). The racing-game effect: Why do video racing games increase risk-taking inclinations? *Personality and Social Psychology Bulletin, 35*(10), 1395- 1409.

Fischer, P., Guter, S., & Frey, D. (2008). The effects of risk-promoting media on inclinations toward risk-taking. *Basic and Applied Social Psychology, 30*, 1-11.

Fischer, P., Kubitzki, J., Guter, S., & Frey, D. (2007). Virtual driving and risk-taking: Do racing games increase risk-taking cognitions, affect and behaviors? *Journal of Experimental Psychology: Applied, 13*(1), 22-31.

Fischer, P., Greitemeyer, T., Kastenmüller, A., Vogrincic, C., & Sauer, A. (2011). The effects of risk glorifying media exposure on risk-positive cognitions, emotions, and behaviors: A meta-analytic review. *Psychological Bulletin, 137*(3), 367-390.

Forgas, J. P. (Ed.). (2001). *Handbook of affect and social cognition.* Mahwah, NJ: Erlbaum.

Frijda, N. H., Manstead, A. S. R., & Bem, S. (Eds.) (2000). *Emotion and beliefs: How feelings influence thoughts.* Cambridge, U.K: Cambridge University Press.

Frost, K., Frank, E.F., & Maibach, E. (1997). Relative risk in the news media: A

quantification of misrepresentation. *American Journal of Public Health, 87*(5), 842-845.

Gerbner, G., Gross, L., Morgan, M., & Signorielli, N. (1986). Living with television: The dynamics of the cultivation process. In J. Bryant, D. Zillmann (Eds.) *Perspectives on media effects* (pp. 17-40). London: Lawrence Erlbaum Associates.

Hall, A. (2005). Sensation seeking and the use and selection of media materials. *Psychological Reports, 97,* 236-244.

Harris, D., & Willoughby, H. (2009). Resuscitation on television: Realistic or ridiculous? A quantitative observational analysis of the portrayal of cardiopulmonary resuscitation in television medical drama. *Resuscitation, 80,* 1275-1279.

Haynes, C.A., Miles, J.N., & Clements, K. (2000). A confirmatory factor analysis of two models of sensation seeking. *Personality and Individual Differences, 29,* 823-839.

Helweg-Larsen, M., & Shepperd, J.A. (2001). Do moderators of the optimistic bias affect personal or target risk estimates? A review of the literature. *Personality and Psychology Review, 5*(1), 74-95.

Ivers, R., Senserrick, T., Boufous, S., Stevenson, M., Chen, H-Y., Woodward, M., & Norton, R. (2009). Novice drivers' risky driving behavior, risk perception, and crash risk: Findings from the drive study. *American Journal of Public Health, 99*(9), 1638-1644.

Kline, R. B. (2010). *Principles and practices of structural equation modeling* (3rd ed.). New York: Guilford Press.

Lang, A., & Ewoldsen, D. (2010). Beyond effects: Conceptualizing communication as dynamic complex, nonlinear, and fundamental. In S. Allan (Ed.), *Rethinking communication* (pp.109-120). Cresskill, NJ: Hampton Press.

Lemal, M. (2010). *"It could happen to you". Television and health risk perception.* Ph.D. Thesis, KU Leuven, School for Mass Communication Research, Belgium.

Lemal, M., & Van den Bulck, J. (2011). Television news coverage about cervical cancer: Impact on female viewers' vulnerability perception and fear. *European Journal of Public Health, 21*(3), 381-386.

Millar, M.M., & Dillman, D.A. (2011). Improving response to web and mixed-mode surveys. *Public Opinion Quarterly*, *75*(2), 249-269.

Moeller, A.D., Moeller, J.J., Rahey, S.R., & Sadler, R.M. (2011). Depiction of seizure first aid management in medical television dramas. *The Canadian Journal of Neurological Sciences*, 38, 723-727.

Niederlaender, E. (2006). *Causes of Death in Europe. Eurostat. Statistics in focus.* Eurostat. Population and social conditions. Health. European Communities[online]. Downloaded from http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NK-06-010/EN/KS-NK-06-010-EN.PDF on March 14, 2007.

Preacher, K.J., & Hayes, A.F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879-891.

Rhodes, N. (in press). Fear appeal messages: Positive affect and message processing. *Communication Research.*

Rhodes, N., & Pivik, K. (2011). Age and gender differences in risky driving: The roles of positive affect and risk perception. *Accident Analysis and Prevention, 43*, 923-931.

Royal, D. (2003). *Volume II: Findings national survey of speeding and unsafe driving attitudes and behavior: 2002.* The Gallup Organization. Washington DC. Retrieved from http://www.nhtsa.dot.gov/people/injury/drowsy_driving1/speed_volII_finding/SpeedVolumeIIFindingsFinal.pdf on March 14, 2007.

Sax, L.J., Gilmartin, S.K., & Bryant, A.N. (2003). Assessing response rates and nonresponse bias in web and paper surveys. *Research in Higher Education, 44*(4), 409-432.

Shope, J.T. (2006). Influences on youthful driving behavior and their potential for guiding interventions to reduce crashes. *Injury Prevention, 12*, 9-14.

Shrum, L.J. (2004). Magnitude of effects of television viewing on social perceptions vary as a function of data collection method: Implications for psychological processes. *Advances in Consumer Research, 31*, 511-513.

Snyder, L.B., & Rouse, R.A. (1995). The media can have more than an impersonal impact: The case of AIDS risk-perceptions and behavior. *Health Communication, 7*(2), 125-145.

Strauman, E., & Goodier, C.B. (2008). Not your Grandmother's doctor show: A review of Grey's Anatomy, House and Nip/Tuck. *Journal of Medical Humanities, 29*, 127-131.

Sullman, M.J.M., & Taylor, J.E. (2010). Social desirability and self-reported driving behaviors: Should we be worried? *Transportation Research Part F, 13*, 215-221.

Taylor, J.E., Deane, F.P., & Podd, J.V. (2007). Driving fear and driving skills: Comparison between fearful and control samples using standardized and on-road assessment. *Behaviour Research and Therapy, 45*, 805-818.

Toroyan, T., & Peden, M. (Eds.) (2007). *Youth and road safety*. World Health Organization, Geneva.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5* (September), 207-232.

Tyler, T.R., & Cook, F.L. (1984). The mass media and judgments of risk: Distinguishing impact on personal and societal level judgments. *Journal of Personality and Social Psychology, 47*, 691-708.

Ulleberg, P. (2002). Personality subtypes of young drivers. Relationship to risk-taking preferences, accident involvement and response to a traffic safety campaign. *Transportation Research Part F, 4,* 279-297.

Ulleberg, P., & Rundmo, T. (2002). Risk-taking attitudes among young drivers: The psychometric qualities and dimensionality of an instrument to measure young drivers' risk-taking attitudes. *Scandinavian Journal of Psychology, 43*(3), 227-237.

Ulleberg, P., & Rundmo, T. (2003). Personality, attitudes and risk perception as predictors of risky driving behaviour among young drivers. *Safety Science, 41*(5), 427-443.

Valente, T.W., Murphy, S., Huang, G., Gusek, J., Greene, J., & Beck, V. (2007). Evaluating a minor storyline on ER about teen obesity, hypertension and 5 a day. *Journal of Health Communication, 12,* 551-566.

Valkenburg, P. M., & Peter, J. (2013). The differential susceptibility to media effects model. *Journal of Communication, 63*(2), 221-243.

Van Mierlo, J. (2007). *The role of television in the cultivation of perceptions and attitudes toward medicine and health.* Ph.D. Thesis, KU Leuven, School for Mass Communication Research, Belgium.

Weitzer, R., & Kubrin, C.E. (2004). Breaking news: How local TV news and real-world conditions affect fear of crime. *Poetics, 39,* 107-124.

Whissell, R.W., & Bigelow, B.J. (2003). The speeding attitude scale and the role of sensation seeking in profiling young drivers at risk. *Risk Analysis, 23*(4), 811-820.

White, H.R. (1991). Marijuana use and delinquency: A test of the 'independent cause' hypothesis. *Journal of Drug Issues, 21(*2), 231-256.

Williams, A.F., Kyrychenko, S.Y., & Retting, R.A. (2006). Characteristics of speeders. *Journal of Safety Research, 37,* 227-232.

Yaoshan, X., Wei, D., & Yongjuan, L. (2011). The effect of fear appeal on risky driving attitude and intention change: An experimental study. *Business Management and Electronic Information. (BMEI 2011), 1*, 255-258.